CLAIMS

[Claim 1]

A method for estimating connection loss of an optical connector including a ferrule, which has a through-hole along the longitudinal direction, and an optical fiber which is inserted and fixed into the ferrule, comprising steps of:

calculating axial misalignment based on both of at least distribution data of dimension parameters of the ferrule and at least distribution data of dimension parameters of the optical fiber;

calculating connection loss based on the axial misalignment; and

simulating distribution of the connection loss.

[Claim 2]

The method for estimating connection loss of an optical connector, according to Claim 1, wherein the distribution of the connection loss is simulated by randomly extracting particular data out of both of at least distribution data of dimension parameters of the ferrule and at least distribution data of dimension parameters of the optical fiber, and then calculating the axial misalignment based on combination thereof, and then calculating connection loss based on the axial misalignment to obtain a plurality of connection loss data.

[Claim 3]

The method for estimating connection loss of an optical connector, according to Claim 1, wherein, in the method for estimating connection loss, distribution data of

angle parameters, which represents orientation error of the through-hole of the ferrule with respect to an outer surface thereof, reside in the combination.

[Claim 4]

The method for estimating connection loss of an optical connector, according to Claim 3, wherein distribution data of either dimension parameters or angle parameters of a split sleeve, or distribution data of connection loss of a split sleeve reside in the combination.

[Claim 5]

The method for estimating connection loss of an optical connector, according to Claim 4, wherein the axial misalignment is calculated based on clearance caused between an inner diameter of the ferrule and an outer diameter of the optical fiber, and coaxiality between the outer surface and the through-hole of the ferrule, and coaxiality between a core and a clad of the optical fiber.

[Claim 6]

The method for estimating connection loss of an optical connector, according to Claim 5, wherein the distribution of the connection loss is simulated by calculating the axial misalignment as single-plug axial misalignment, based on clearance caused between an inner diameter of the ferrule and an outer diameter of the optical fiber, and coaxiality between the outer surface and the through-hole of the ferrule, and coaxiality between a core and a clad of the optical fiber, and then calculating paired axial misalignment using two data of the single-plug axial misalignment with axial misalignment due to a difference in outer diameter of the ferrule, and then

calculating connection loss based on the paired axial misalignment.

[Claim 7]

The method for estimating connection loss of an optical connector, according to Claim 6, wherein the distribution of the connection loss is simulated by obtaining the total connection loss that is the sum of the connection loss calculated based on the paired axial misalignment, connection loss calculated based on paired orientation error, and the connection loss of the split sleeve.

[Claim 8]

The method for estimating connection loss of an optical connector, according to Claim 1, wherein the distribution of the connection loss is calculated by calculating orientation error based on distribution data of angle parameters of the ferrule; calculating the sum of the orientation errors in terms of vector quantity in a plane perpendicular to an axial direction of the optical fiber and the ferrule; and calculating distribution of axial misalignment and/or orientation error in a connection state.

[Claim 9]

The method for estimating connection loss of an optical connector, according to Claim 8, wherein, when the distribution of axial misalignment resulting from both of distribution data of dimension parameters of the ferrule and distribution data of dimension parameters of the optical fiber, and/or the distribution of orientation error resulting from distribution data of angle parameters of the ferrule are summed in terms of vector, an angle between two

vectors of misalignment or orientation error to be summed is variable-transformed into a magnitude of a summed vector of misalignment or orientation error.

[Claim 10]

The method for estimating connection loss of an optical connector, according to Claim 8, wherein the distribution of the connection loss is calculated by calculating distribution of single-plug axial misalignment by summing in terms of vector distribution of clearance caused between an inner diameter of the ferrule and an outer diameter of the optical fiber, distribution of coaxiality between the outer surface and the through-hole of the ferrule, and distribution of coaxiality between a core and a clad of the optical fiber, and then calculating paired distribution of axial misalignment by summing in terms of vector two distribution of the single-plug axial misalignment with distribution of difference in outer diameter of the ferrule, and then calculating distribution of connection loss based on the paired distribution of axial misalignment.

[Claim 11]

The method for estimating connection loss of an optical connector, according to Claim 8, wherein the orientation error is calculated based on a tilt of the longitudinal direction of the through-hole of the ferrule to the outer surface thereof.

[Claim 12]

The method for estimating connection loss of an optical connector, according to Claim 8, wherein the distribution of connection loss is calculated based on the

paired distribution of orientation error which is calculated by summing in terms of vector two distribution of orientation error of the ferrule.

[Claim 13]

The method for estimating connection loss of an optical connector, according to Claim 10, wherein the distribution of the connection loss is calculated by obtaining the total connection loss that is the sum of the connection loss calculated based on the paired axial misalignment, connection loss calculated based on paired orientation error, and the connection loss of the split sleeve.

[Claim 14]

The method for estimating connection loss of an optical connector, according to Claim 1, wherein the n-th moment of connection loss is calculated by calculating orientation error based on distribution data of angle parameters of the ferrule; calculating the sum of the orientation errors in terms of vector quantity in a plane perpendicular to an axial direction of the optical fiber and the ferrule; and calculating the n-th moment of axial misalignment and/or orientation error in a connection state.

[Claim 15]

The method for estimating connection loss of an optical connector, according to Claim 14, wherein an average is calculated based on the 1st moment of connection loss, and a standard deviation or a variance is calculated based on the 1st and 2nd moments of connection loss.

[Claim 16]

The method for estimating connection loss of an

optical connector, according to Claim 14, wherein the n-th moment of the connection loss is calculated by calculating the n-th moment of single-plug axial misalignment by summing in terms of vector the n-th moment of clearance caused between an inner diameter of the ferrule and an outer diameter of the optical fiber, the n-th moment of coaxiality between the outer surface and the through-hole of the ferrule, and the n-th moment of coaxiality between a core and a clad of the optical fiber, and then calculating the paired n-th moment of axial misalignment by summing in terms of vector the two n-th moments of the single-plug axial misalignment with the n-th moment of difference in outer diameter of the ferrule, and then calculating the n-th moment of connection loss based on the paired n-th moment of axial misalignment.

[Claim 17]

The method for estimating connection loss of an optical connector, according to Claim 14, wherein the orientation error is calculated based on a tilt of the longitudinal direction of the through-hole of the ferrule to the outer surface thereof.

[Claim 18]

The method for estimating connection loss of an optical connector, according to Claim 14, wherein the n-th moment of connection loss is calculated based on the paired n-th moment of orientation error which is calculated by summing in terms of vector the two n-th moments of orientation error of the ferrule.

[Claim 19]

The method for estimating connection loss of an

optical connector, according to Claim 16, wherein the n-th moment of the connection loss is calculated by obtaining total connection loss that is the sum of the connection loss calculated based on the paired axial misalignment, connection loss calculated based on paired orientation error, and the connection loss of the split sleeve.

[Claim 20]

The method for estimating connection loss of an optical connector, according to Claim 1, wherein the n-th moment of connection loss is calculated by performing tuning, that is a method for aligning a misaligned direction of a single plug including the ferrule and the optical fiber, based on both of distribution data of axial misalignment of the single plug, and distribution data of a diameter of the ferrule; and calculating the n-th moment of axial misalignment in the tuned connection state.

[Claim 21]

The method for estimating connection loss of an optical connector, according to Claim 20, wherein an average is calculated based on the 1st moment of connection loss, and a standard deviation or a variance is calculated based on the 1st and 2nd moments of connection loss.

[Claim 22]

The method for estimating connection loss of an optical connector, according to Claim 20, wherein the orientation error is calculated based on a tilt of the longitudinal direction of the through-hole of the ferrule to the outer surface thereof.

[Claim 23]

The method for estimating connection loss of an

optical connector, according to Claim 20, wherein the n-th moment of connection loss is calculated based on the paired n-th moment of orientation error which is calculated by summing in terms of vector the two n-th moments of orientation error of the ferrule.

[Claim 24]

The method for estimating connection loss of an optical connector, according to Claim 20, wherein the n-th moment of the connection loss is calculated by obtaining the total connection loss that is the sum of the connection loss calculated based on the paired axial misalignment, connection loss calculated based on paired orientation error, and the connection loss of the split sleeve.

[Claim 25]

A simulator for estimating connection loss of an optical connector, comprising: the method for estimating connection loss of an optical connector, according to Claim 1.